Topic: Implicit differentiation

Question: Using implicit differentiation, we:

Answer choices:

A treat x as a variable and y as a function

B treat x as a variable and y as a variable

C treat x as a function and y as a function

D treat x as a function and y as a variable

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Solution: A

When we use implicit differentiation, it's important to remember that we can't treat y as a variable, the same way we would if we were differentiating "normally".

In contrast, we have to treat y as a function of y in terms of x, and therefore apply chain rule whenever we take the derivative of y, which means we multiply by dy/dx.

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Topic: Implicit differentiation

Question: Find the derivative.

$$x^2 - y^2 = 9$$

Answer choices:

A $\frac{y}{x}$

B $-\frac{x}{y}$

C $\frac{x}{y}$

D $-\frac{y}{x}$

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Solution: C

Differentiating implicitly, we have

$$\frac{d}{dx}\left(x^2\right) - \frac{d}{dx}\left(y^2\right) = \frac{d}{dx}(9)$$

$$2x - 2y\frac{dy}{dx} = 0$$

$$-2y\frac{dy}{dx} = -2x$$

$$\frac{dy}{dx} = \frac{-2x}{-2y}$$

$$\frac{dy}{dx} = \frac{x}{y}$$

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Topic: Implicit differentiation

Question: Every time we take the derivative of y, implicit differentiation requires us to multiply by which of the following?

Answer choices:

A 1

B y

C 0

D $\frac{dy}{dx}$

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Solution: D

We have to treat y as a function of y in terms of x, and therefore apply chain rule whenever we take the derivative of y, which means we multiply by dy/dx.

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